

II B. TECH II SEMESTER REGULAR EXAMINATIONS, JUNE - 2022
COMPLEX VARIABLES AND STATISTICAL METHODS
(Common to EEE and MEC)

Time: 3 hours

Max. Marks: 70

Note: Answer **ONE** question from each unit (**5 × 14 = 70 Marks**)

UNIT-I

1. a) Check the continuity of $f(z)$ at $z = 0$, where $f(z) = \begin{cases} \frac{x^2y}{x^4+y^2} & \text{if } z \neq 0 \\ 0 & \text{if } z = 0 \end{cases}$. [7M]

b) Evaluate $\int_c \frac{z \cos z}{(z-\frac{\pi}{3})^3} dz$ here c is $|z - 1| = 1$. [7M]

(OR)

2. a) Evaluate $\oint [(x + y)dx + x^2ydy]$ along $y = 3x$ between $(0,0)$ and $(3,9)$. [7M]

b) Show that the function $e^x \cos y$ is harmonic. [7M]

UNIT-II

3. a) Find the Laurent's series of $f(z) = \frac{1}{z^2-4z+3}$ for $|z| < 1$. [7M]

b) Evaluate $\oint_c \frac{e^{2z}}{(z-1)(z-2)} dz$ where c is the circle $|z| = 0.5$ using Cauchy residue theorem. [7M]

(OR)

4. a) Expand e^z by Taylor's series about $z = 1$. [7M]

b) Find the poles and corresponding residues of $f(z) = \frac{z+3}{z(z^2-z-2)}$. [7M]

UNIT-III

5. a) If $P(A) = \frac{1}{2}$, $P(B) = \frac{1}{3}$ and $P(A \cap B) = \frac{1}{5}$ then find [7M]

(i) $P(A \cup B)$ (ii) $P(\bar{A} \cap B)$ (iii) $P(A \cap \bar{B})$

b) Let X denotes the number of heads in a single toss of 4 coins. [7M]
Determine $P(X < 2)$, $P(1 < X \leq 3)$.

(OR)

6. a) A random variable X has the following probability distribution [7M]

X	4	5	6	8
P(X)	0.1	0.3	0.4	0.2

Determine (i) Expectation (ii) Variance (iii) Standard deviation

b) Suppose the weights of 800 male students are normally distributed with mean $\mu = 140$ pounds and standard deviation 10 pounds. Find the numbers of students whose weights are [7M]

(i) between 138 and 148 pounds

(ii) more than 152 pounds

UNIT-IV

7. a) Random samples of 400 men and 600 women were asked whether they would like to have a flyover near their residence. 200 men and 325 women were in favor of the proposal. Test the hypothesis that proportions of men and women in favor of the proposal are same, at 5% level. [7M]
- b) The heights of 10 males of a given locality are found to be 70,67,62,68,61,68,70,64,64,66 inches. Is it reasonable to believe that the average height is greater than 64 inches? Test at 5% significance level assuming that for 9 degrees of freedom. [7M]

(OR)

8. a) A sample of 64 students has a mean weight of 70 kgs. Can this be regarded as a sample from population with mean weight 56 kgs and standard deviation 25 kgs. [7M]
- b) Two horses A and B were tested according to the time (in seconds) to run a particular track with the following results. [7M]

Horse A	28	30	32	33	33	29	34
Horse B	29	30	30	24	27	29	

Test whether the two horses have the same running capacity.

UNIT-V

9. a) Fit a function of the form $y = ax^b$ to the following data. [7M]
- | | | | | | | | | |
|---|----|----|----|----|----|----|----|----|
| x | 2 | 4 | 7 | 10 | 20 | 40 | 60 | 80 |
| y | 41 | 25 | 18 | 13 | 8 | 5 | 3 | 2 |
- b) The equations of two regression lines are $7x-16y+9=0$ and $5y-4x-3=0$. Find the coefficient of correlation and the means of x and y. [7M]

(OR)

10. a) Find the values of a, b and c. so that $y = a + bx + cx^2$ is the best fit to the data. [7M]

X	10	12	13	16	17	20	25
Y	10	22	24	27	29	33	37

- b) From the following data calculate the rank correlation coefficient after making adjustment for tied ranks. [7M]

x	48	33	40	9	16	16	65	24	16	57
y	13	13	24	6	15	4	20	9	6	19

* * * * *